

## **System and Method for Client-Side Competitive Analysis**

### **BACKGROUND OF THE INVENTION**

#### **1. Technical Field**

The present invention relates in general to a system  
5 and method for client-side competitive analysis. More particularly, the present invention relates to a system and method for, at a client, non-invasively extracting and processing competitive information that is located in a page of data.

#### **10 2. Description of the Related Art**

The Internet has changed the consumer marketplace by providing a means for a user to efficiently shop, literally around the world. On a national scale, a user living in the Midwest is able compare product prices from a small,  
15 West Coast company with those from a small, East Coast company. The user may then buy the product from the lowest priced company. On a global scale, the same user is able to compare prices from companies outside the United States, such as those located in Europe or Japan.

20 When a company sells its products on a local scale, the company is able to analyze its competitors' advertising techniques, such as product pricing and visual content. For example, a company may purchase a local Sunday paper and analyze its competitor's color advertisement that  
25 includes sale items. When competing on the Internet, however, a company does not have the luxury of closely monitoring competitive information since the company may

have hundreds of competitors that change prices on a daily basis.

In an effort to attract online customers, a company is able to control the way in which the company "presents" its products to an online customer when the online customer specifically accesses the company's web site. For example, a company may use a particular font size and background color to visually attract the online customer. However, online customers typically employ portals to perform the task of vendor and price comparison when shopping for merchandise. For example, an online customer may use "dealtime.com" to shop for an electronic device. In this example, dealtime.com searches the Internet for vendors that sell the electronic device, and dealtime.com includes the vendor data (i.e. company name and price) in a web page for the online customer to view.

A challenge found when a company's data is displayed through a portal is that the company does not have the ability to analyze its competitive environment. A portal requests a contribution from a company, and the portal decides where to place the company's contribution response on the portal's page of data. For example, the portal may have agreements with particular companies to highlight their products, such as placing them first on a web page or enlarging their font. As another example, a company's data may be placed on the bottom of the portal's page of data, which may not be viewable unless a user scrolls down to the bottom of the page.

What is needed, therefore, is a system and method for providing a company with the ability to non-invasively

collect and process competitive information that is included in a page of data that is generated from a portal.

**SUMMARY**

It has been discovered that the aforementioned challenges are resolved by using an embedded program to non-intrusively collect and process competitive data from a page of data that is located on a client computer system. When a portal receives a client request, the portal sends a contribution request to a provider server. The provider server includes an embedded program in its response that, in turn, is sent to the portal. The portal includes the embedded program in a page of data, and sends the page of data to the client. Once at the client, the embedded program extracts and processes competitive data that is also included in the page of data.

A client sends a request to a portal inquiring about a particular item. The portal is responsible for gathering information from businesses that correspond to client requests and including the information in a page of data to send to the client. The portal receives the request, and identifies businesses that correspond to the request. For example, the request may be an inquiry as to the price of a digital camera. In this example, the portal identifies online retailers that sell the particular digital camera.

The portal gathers product information by sending a contribution request to each identified online retailer's server. When a provider server receives the contribution request, the provider server retrieves provider data (i.e. price and availability) and also retrieves an embedded program. The provider server includes its provider data

and the embedded program in a response, and sends the response to the portal.

In addition, other competitors' servers receive the portal's contribution request, and the competitors' servers  
5 send their respective competitive data to the portal for inclusion into the portal's page of data. For example, competitor data may include pricing, availability, and shipping information for a particular product.

Once the portal receives responses from each of the  
10 identified online retailers, the portal includes each of the responses in a page of data, and sends the page of data to the client. Since the portal includes the provider server's entire contribution, the embedded program is automatically included in the page of data.

15 The client receives the page of data, and displays the page of data on the client's display. For example, the page of data may include pricing and product availability from businesses for a particular product, as well as advertisements. In addition, the client loads the embedded  
20 program. For example, if the program is in the form of a JavaScript that is embedded in an HTML page, a web browser "interprets" the JavaScript, thus loading the program into memory. Once loaded at a client, the embedded program is designed to extract competitive data from the page of data,  
25 such as a Document Object Model (DOM). A DOM is an HTML page or an XML document that is represented as a full-fledged program object.

After the embedded program extracts and processes the competitive data, the embedded program may choose to  
30 automatically change the provider's data included in the

page of data based upon analyzing the competitive data. For example, a competitor may advertise free product shipping and the provider currently charges ten dollars for shipping a product. In this example, the embedded program  
5 may negate the provider's shipping charges in order to win the client's business.

In one embodiment, the embedded program may be configured to extract competitive data from the page of data and provide the competitive data to the provider  
10 server for further analysis. In this embodiment, the embedded program sends the competitive data to the provider server through a computer network, such as the Internet. The provider server may choose to analyze the competitive data at a later time, or the provider server may choose to  
15 change its provider data in order to win business. For example, the competitive data may identify that one of the competitor's has a lower price than the provider server's price. In this example, the provider server may choose to lower its price in order to win the client's business.  
20 When the provider server wishes to have the embedded program modify the provider server's data included in the page of data at the client, the provider server sends changed data to the embedded program that, in turn, updates the page of data using the changed provider data.

25 The foregoing is a summary and thus contains, by necessity, simplifications, generalizations, and omissions of detail; consequently, those skilled in the art will appreciate that the summary is illustrative only and is not intended to be in any way limiting. Other aspects,  
30 inventive features, and advantages of the present invention, as defined solely by the claims, will become

apparent in the non-limiting detailed description set forth below.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The present invention may be better understood, and  
5 its numerous objects, features, and advantages made  
apparent to those skilled in the art by referencing the  
accompanying drawings. The use of the same reference  
symbols in different drawings indicates similar or  
identical items.

10 **Figure 1** is a diagram showing a client receiving a page  
of data that includes an embedded program that is adapted  
to identify competitive data within the page of data;

**Figure 2** is a client's display showing a page of data;

**Figure 3** is a high level flow chart showing steps taken  
15 in a client requesting a page of data and a portal  
processing the request by querying a provider which, in  
turn, embeds a program in the provider's response;

**Figure 4** is a flowchart showing steps taken in an  
embedded program analyzing competitive data included in a  
20 page of data;

**Figure 5** is a flowchart showing steps taken in a  
provider analyzing competitive data that it received from  
an embedded program that is located at a client; and

**Figure 6** is a block diagram of an information handling  
25 system capable of implementing the present invention.

**DETAILED DESCRIPTION**

The following is intended to provide a detailed description of an example of the invention and should not be taken to be limiting of the invention itself. Rather,  
5 any number of variations may fall within the scope of the invention which is defined in the claims following the description.

**Figure 1** is a diagram showing a client receiving a page of data that includes an embedded program that is adapted  
10 to identify competitive data within the page of data. Provider server **125** corresponds to a particular business, such as an online electronic retail store. Provider server **125** receives inquiries from users and portals (i.e. dealtime.com) requesting pricing and availability  
15 information for products that the business supports.

Client **100** sends request **105** to portal **110** inquiring about a particular item. Portal **110** is responsible for gathering information from businesses that correspond to request **105**, and including the information in a page of  
20 data to send to client **100**. Portal **110** receives request **105**, and identifies companies that correspond to the request. For example, request **105** may be an inquiry as to the price of a digital camera. In this example, portal **110** identifies online retailers that sell the particular  
25 digital camera. **Figure 1** shows that portal **110** identifies three online retailers that sell the item corresponding to request **125**, which are provider server **125**, competitor A server **150**, and competitor B server **160**.



Portal **110** gathers product information by sending a contribution request, such as contribution request **120**, to provider server **125**, competitor A server **150**, and competitor B server **160**. Provider server **125** receives  
5 contribution request **120**, and retrieves provider data (i.e. price and availability) and an embedded program from data store **130**. Once loaded at a client, the embedded program is designed to extract competitive data from a page of data, such as a Document Object Model (DOM). A DOM is an  
10 HTML page or an XML document that is represented as a full-fledged program object. Provider server **125** includes its provider data and program **145** in a response, and sends provider response **140** to portal **110**.

In addition, competitor A sever **150** and competitor B  
15 server **160** receive contribution request **120**, and send competitor A response **155** and competitor B response **165**, respectively, to portal **110** which includes competitive information. For example, the competitor responses may include pricing, availability, and shipping information for  
20 the particular product.

Once portal **110** receives responses from each of the servers, portal **110** includes each of the responses in a page of data, and sends combined data **170** to client **100**. Since portal **110** included provider server **125**'s  
25 contribution, program **145** is automatically included in combined data **145**.

Client **100** receives combined data **170**, and displays page **175** on client **100**'s display. For example, page **175** may include the three competitor's data (i.e. pricing,  
30 availability, etc.) as well as advertisements (see **Figure 2**

and corresponding text for further details regarding page properties). In addition, client **100** loads program **145** whereby program **145** extracts competitive data from page **175**.

5        Program **145** collects the competitive data, and may choose to automatically change the provider data in page **175** based on the competitive data. For example, a competitor may advertise free product shipping and the provider currently charges ten dollars for shipping a  
10 product. In this example, program **145** may negate the provider's shipping charges in order to win client **100**'s business.

In one embodiment, program **145** may be configured to extract competitive data from page **175** and provide the  
15 competitive data to provider server **125** for further analysis. In this embodiment, program **145** sends competitor data **180** to provider server **125** through a computer network, such as the Internet. Provider server **125** may choose to analyze the competitive data at a later time, or provider  
20 server **125** may choose to change its provider data in order to win business. For example, the competitive data may identify that one of the competitor's has a lower price than provider server **125**. In this example, provider server **125** may choose to lower its price in order to win client  
25 **100**'s business. If provider server **125** wishes to update its data, provider server sends data response **190** to program **145** that includes changed provider data. Program **145** receives data response **190**, and updates page **175** using the changed provider data.

**Figure 2** is a client's display showing a page of data. Window **200** displays a page of data that a client receives over a computer network, such as through the Internet from a portal. For example, the client's user may send a  
5 request to "dealttime.com" requesting the price of a particular electronic item. In this example, dealttime.com sends the client the page of data that includes product information that it received from an online retailer that corresponds to the electronic item, such as the price of a  
10 product.

Area **205** includes competitive data corresponding to a first online retailer that is displayed at the top of the page of data. Area **205** includes domain **210** (i.e. company name), and competitive data **215** and **220**. Competitive data  
15 **215** includes a model number that corresponds to the client's request and competitive data **220** includes a price that corresponds to the client's request. In addition, area **205** displays the competitor's data in a large, bold, font, making it more appealing to a user. As one skilled  
20 in the art can appreciate, other types of competitive data may be displayed, such as shipping costs and product availability.

Area **225** includes competitive data corresponding to a second online retailer and is displayed in the middle of  
25 the page of data. Area **225** includes domain **230** (i.e. company name), and competitive data **235** and **240**. Competitive data **235** includes a model number that corresponds to the client's request and competitive data **240** includes a price that corresponds to the client's  
30 request. In addition, area **225** displays the competitor's

data in a large, bold, italicized font, making it more appealing to a user.

Advertisement **250** is an area which the page of data displays an advertisement. For example, the portal may  
5 display an advertisement from one of its sponsors, such as "doubleclick.com."

Area **260** includes provider data that is not completely displayed due to its position on the page of data. A portion of the provider data shows domain **270**, but does not  
10 include other information, such as a model number and a price that corresponds to the electronic device. When a user views window **200**, the user may not notice area **260** because it starts at the bottom of the window, and advertisement **250** is between the other online retailers' information. In addition, the provider data is displayed  
15 with small, regular font that is not as noticeable as the competitive fonts. In this example, an embedded program identifies that the provider data is not optimally positioned relative to the competitive data.

20 **Figure 3** is a high level flow chart showing steps taken in a client requesting a page of data and a portal processing the request by querying a provider which, in turn, embeds a program in the provider's response. Client processing commences at **300**, whereupon the client sends a  
25 request to the portal at step **302**. For example, the client's user may send a request to "dealttime.com" requesting the price of a particular electronic item, such as a digital camera.

Portal processing commences at **340**, whereupon the  
30 portal receives the client's request at step **342**. The

portal identifies providers that correspond to the request, such as online electronic distributors, at step **344**. At step **346**, the portal sends a contribution request to the identified providers. Using the example described above, 5 dealtime.com may identify four electronic distributors that sell the digital camera, and dealtime.com sends a contribution request to each of the four distributors.

Provider processing commences at **360**, whereupon the provider receives the contribution request from the portal 10 at step **362**. The provider retrieves provider data and an embedded program from data store **130** at step **364**. Provider data may include items such as the price of a particular electronic device, display attributes (i.e. font size) corresponding to the provider's name, and other items such 15 as logos and backgrounds. The embedded program is adapted to extract competitive data from a page of data that the portal generates and sends to the client (see **Figure 4** and corresponding text for further details regarding embedded program functionality). Data store **130** is the same as that 20 shown in **Figure 1** and may be stored on a nonvolatile storage area, such as a computer hard drive. The provider includes the provider data and the embedded program in a contribution response, and sends the response to the portal at step **366**.

25 The portal receives the provider's contribution response and includes it, as well as competitive data, in a page of data (step **348**). The portal sends the page of data, which includes the embedded program, to the client at step **350**, and portal processing ends at **352**.

The client receives the page of data from the portal at step **304** which may be in the form of a Document Object Model (DOM). A DOM is an HTML page or an XML document that is represented as a full-fledged program object.

5 Processing invokes the embedded program at step **306**, and the embedded program extracts competitive data from page store **312** (the storage location of the page of data), and stores the competitive data in analysis store **310** (pre-defined process block **308**, see **Figure 4** and corresponding

10 text for further details). Analysis store **310** and page store **312** may be stored on a volatile storage area, such as internal memory.

A determination is made as to whether the embedded program wishes to send the competitive data to the provider

15 (decision **314**). For example, the embedded program may be configured to either automatically change provider data based upon its analysis of competitive data, or send the competitive data to the provider for the provider to make the determination. If the embedded program does not wish

20 to send the competitive data to the provider, decision **314** branches to "No" branch **320** bypassing competitive data transmittal steps. On the other hand, if the embedded program wishes to send the competitive data to the provider, decision **314** branches to "Yes" branch **316**

25 whereupon the embedded program sends the competitive data to the provider at step **318**.

The provider receives the competitive data at step **370**, and stores the competitive data in temp store **372**. Temp store **372** may be stored on a nonvolatile storage area,

30 such as a computer hard drive. The provider analyzes the competitive data to determine whether it should change its

provider data (pre-defined process block **374**, see **Figure 5** and corresponding text for further details). A determination is made as to whether the provider should send changed provider data to the embedded program to incorporate in the page of data (decision **378**). If the provider does not wish to send changed provider data, decision **378** branches to "No" branch **384** bypassing changed provider data sending steps. On the other hand, if the provider wishes to send changed provider data, decision **378** branches to "Yes" branch **380** whereupon the provider sends the changed provider data at step **382**, and provider processing ends at **390**.

At the client, a determination is made as to whether to change the provider data that is included in page store **312** (decision **322**). This determination may be based on the embedded program receiving data from the provider, or the determination may be based upon the embedded program's analysis of the competitive data and the embedded program making the determination on its own. If the embedded program should change the provider data, decision **322** branches to "Yes" branch **324** whereupon the embedded program changes the provider data included in page store **312** at step **326**. On the other hand, if the embedded program should not change the provider data, decision **322** branches to "No" branch **328** bypassing provider data changing steps. Client processing ends at **330**.

**Figure 4** is a flowchart showing steps taken in an embedded program analyzing competitive data included in a page of data. The embedded program corresponds to a provider that included the embedded program in a contribution request and the embedded program is adapted to

extract competitive data from a page of data at a client. Processing commences at **400**, whereupon the embedded program identifies competitor domains and data values that are located in page store **312**, and stores the competitor domains and data values in analysis store **310** (step **410**). For example, the embedded program may detect a competitor domain "ABC Incorporated" which sells an electronic device. In this example, the embedded program also identifies ABC Incorporated's data value, or price for the electronic device, which is "\$50.00." Page store **312** stores the page of data and is the same as that shown in **Figure 3**. Analysis store **310** stores the extracted competitive data and is the same as that shown in **Figure 3**.

At step **420**, the embedded program identifies the competitor's page position from page store **312**, and stores the page position in analysis store **310**. For example, the embedded program may detect that three competitors have their data displayed at the top of the page of data. The embedded program then identifies display attributes corresponding to the competitors and stores the display attributes in analysis store **310** (step **430**). For example, a competitor may use a large, bold font to display his data on the page of data.

At step **440**, the embedded program identifies the provider's page position that is located in page store **312**. For example, the provider's data may be displayed at the bottom of the page of data and a user is required to scroll to the bottom of the page of data in order to view the provider's data. The embedded program then identifies page and layout properties of the page of data at step **450**, and stores them in analysis store **310**. For example, the page



of data may have particular space for advertisements and banners. Processing returns at **460**.

**Figure 5** is a flowchart showing steps taken in a provider analyzing competitive data that it received from an embedded program that is located at a client. The provider included the embedded program in a contribution request, which was sent to a portal. In turn, the portal included the embedded program in a page of data that it sent to the client. Once at the client, the embedded program extracted competitive data included in the page of data, and sent the competitive data to the provider (see **Figure 4** and corresponding text for further details regarding competitive data extraction).

Processing commences at **500**, whereupon processing extracts page layout properties from temp store **372** at step **510**. For example, the page layout properties may include areas on the page of data that are dedicated to banner advertisements. Temp store **372** includes the competitive data and is the same as that shown in **Figure 3**. Processing then extracts and analyzes competitor domains and data values from temp store **372** at step **520**. For example, the page of data may have included three competitors, each having a different data value, or price, for a particular electronic device. In this example, processing may compare the competitor's prices with the provider's price to determine whether the provider should lower its price.

A determination is made as to whether to change the provider's data values based upon the analysis of the competitors' data values (decision **530**). If processing should not change the provider's data value, decision **530** branches to "No" branch **538** bypassing data value-changing

steps. On the other hand, if processing should change provider data values, decision **530** branches to "Yes" branch **532** whereupon processing adjusts the provider data values located in data store **130** at step **535**. Using the example  
5 described above, processing may have determined that the provider's price for the electronic device is higher than the other three competitors. In this example, processing may adjust the provider's price to be lower than the three competitors' prices. Data store **130** is the same as that  
10 shown in **Figure 1** and may be stored on a nonvolatile storage area, such as a computer hard drive.

At step **540**, processing extracts competitor display attributes from temp store **372**, and analyzes the competitor's display attributes. For example, a competitor  
15 may display his name and data value in a large, bold font. A determination is made as to whether to change the provider's display attributes based upon the analysis of the competitor display attributes (decision **550**). If processing should not change provider display attributes,  
20 decision **550** branches to "No" branch **558** bypassing display attribute-changing steps. On the other hand, if processing should change the provider display attributes, decision **550** branches to "Yes" branch **552** whereupon processing adjusts the provider display attributes that are located in data  
25 store **130** at step **555** (i.e. increase font size).

At step **560**, processing extracts competitor and provider page position from temp store **372**, and analyzes the page positions. For example, three competitors may have their data displayed at the top of the page of data,  
30 and the provider may have its data displayed at the bottom of the page of data. In this example, a user is able to view the three competitors' data, but has to scroll down to

the bottom of the page of data in order to see the provider's data. A determination is made as to whether the provider has an acceptable page position (i.e. top of page) (decision **570**). If the provider has an acceptable page position, decision **570** branches to "Yes" branch **578** bypassing page position-negotiating steps. On the other hand, if the provider does not have an acceptable page position, decision **570** branches to "No" branch **572** whereupon processing informs the provider that it does not have acceptable page position, and that the provider should take action, such as negotiate with a portal to receive adequate page position (step **580**). Processing returns at **590**.

**Figure 6** illustrates information handling system **601** which is a simplified example of a computer system capable of performing the computing operations described herein. Computer system **601** includes processor **600** which is coupled to host bus **602**. A level two (L2) cache memory **604** is also coupled to host bus **602**. Host-to-PCI bridge **606** is coupled to main memory **608**, includes cache memory and main memory control functions, and provides bus control to handle transfers among PCI bus **610**, processor **600**, L2 cache **604**, main memory **608**, and host bus **602**. Main memory **608** is coupled to Host-to-PCI bridge **606** as well as host bus **602**. Devices used solely by host processor(s) **600**, such as LAN card **630**, are coupled to PCI bus **610**. Service Processor Interface and ISA Access Pass-through **612** provides an interface between PCI bus **610** and PCI bus **614**. In this manner, PCI bus **614** is insulated from PCI bus **610**. Devices, such as flash memory **618**, are coupled to PCI bus **614**. In one implementation, flash memory **618** includes BIOS code that incorporates the necessary processor executable

code for a variety of low-level system functions and system boot functions.

PCI bus **614** provides an interface for a variety of devices that are shared by host processor(s) **600** and  
5 Service Processor **616** including, for example, flash memory **618**. PCI-to-ISA bridge **635** provides bus control to handle transfers between PCI bus **614** and ISA bus **640**, universal serial bus (USB) functionality **645**, power management functionality **655**, and can include other functional  
10 elements not shown, such as a real-time clock (RTC), DMA control, interrupt support, and system management bus support. Nonvolatile RAM **620** is attached to ISA Bus **640**. Service Processor **616** includes JTAG and I2C busses **622** for communication with processor(s) **600** during initialization  
15 steps. JTAG/I2C busses **622** are also coupled to L2 cache **604**, Host-to-PCI bridge **606**, and main memory **608** providing a communications path between the processor, the Service Processor, the L2 cache, the Host-to-PCI bridge, and the main memory. Service Processor **616** also has access to  
20 system power resources for powering down information handling device **601**.

Peripheral devices and input/output (I/O) devices can be attached to various interfaces (e.g., parallel interface **662**, serial interface **664**, keyboard interface **668**, and  
25 mouse interface **670** coupled to ISA bus **640**. Alternatively, many I/O devices can be accommodated by a super I/O controller (not shown) attached to ISA bus **640**.

In order to attach computer system **601** to another computer system to copy files over a network, LAN card **630**  
30 is coupled to PCI bus **610**. Similarly, to connect computer system **601** to an ISP to connect to the Internet using a

telephone line connection, modem **675** is connected to serial port **664** and PCI-to-ISA Bridge **635**.

While the computer system described in **Figure 6** is capable of executing the processes described herein, this  
5 computer system is simply one example of a computer system. Those skilled in the art will appreciate that many other computer system designs are capable of performing the processes described herein.

One of the preferred implementations of the invention  
10 is an application, namely, a set of instructions (program code) in a code module which may, for example, be resident in the random access memory of the computer. Until required by the computer, the set of instructions may be stored in another computer memory, for example, on a hard  
15 disk drive, or in removable storage such as an optical disk (for eventual use in a CD ROM) or floppy disk (for eventual use in a floppy disk drive), or downloaded via the Internet or other computer network. Thus, the present invention may be implemented as a computer program product for use in a  
20 computer. In addition, although the various methods described are conveniently implemented in a general purpose computer selectively activated or reconfigured by software, one of ordinary skill in the art would also recognize that such methods may be carried out in hardware, in firmware,  
25 or in more specialized apparatus constructed to perform the required method steps.

While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that, based upon the teachings herein,  
30 changes and modifications may be made without departing

from this invention and its broader aspects and, therefore, the appended claims are to encompass within their scope all such changes and modifications as are within the true spirit and scope of this invention. Furthermore, it is to  
5 be understood that the invention is solely defined by the appended claims. It will be understood by those with skill in the art that if a specific number of an introduced claim element is intended, such intent will be explicitly recited in the claim, and in the absence of such recitation no such  
10 limitation is present. For a non-limiting example, as an aid to understanding, the following appended claims contain usage of the introductory phrases "at least one" and "one or more" to introduce claim elements. However, the use of such phrases should not be construed to imply that the  
15 introduction of a claim element by the indefinite articles "a" or "an" limits any particular claim containing such introduced claim element to inventions containing only one such element, even when the same claim includes the introductory phrases "one or more" or "at least one" and  
20 indefinite articles such as "a" or "an"; the same holds true for the use in the claims of definite articles.